MSX

EASI-SPEECH

INSTRUCTION MANUAL

EASI-SPEECH

CAUTION: The EASI-SPEECH Cartridge must NEVER be plugged into or removed from a computer which is switched ON. To do so may damage both the computer and the EASI-SPEECH Cartridge.

EASI-SPEECH is an allophone speech synthesiser designed for use with MSX computers. It can be plugged into any cartridge slot on the MSX and can be operated from BASIC or machine code.

The allophone system of speech synthesis works by having a library of sounds rather than a library of complete words. These basic sounds can be sequenced together to form words, thus supplying an almost unlimited vocabulary.

EASI-SPEECH is somewhat different to other allophone speech synthesisers in that it also contains a pre-programmed library of useful words to make programming easier and more compact.

A Text to Speech converter is also included so that speech data can be input in pseudo English. This is the most common method of using an allophone speech synthesiser.

GETTING STARTED.

1. Switch OFF your MSX computer.
2. Insert the EASI-SPEECH Cartridge into the cartridge slot in your MSX computer. The cartridge can only be inserted one way round.
3. Turn your T.V. volume control to about 1/3 full volume.
4. Switch on your MSX computer.

You should hear a continuous "eeeeee" tone from the T.V. speaker for a few seconds. After the Microsoft copyright message, the message:

```
EASI-SPEECH Version 1.0
Copyright R.AMY 1987
```

should appear. The sentence "MSX EASI-SPEECH" should now be heard from the T.V. speaker followed by the usual MSX BASIC 28815 bytes free message on screen. If this sequence of events does not occur then switch off your computer and check that the EASI-SPEECH cartridge has been properly inserted in the cartridge slot.

Once you have the EASI-SPEECH up and running try entering the following command:

```
S=USR9(511)
```

If all is well you should once again hear the "MSX EASI-SPEECH" sentence.

All EASI-SPEECH commmands are performed using the USR9 Basic command. There is no need to use the DEFUSR statement to define the USR9 address as this is all taken care of by EASI-SPEECH at switch on.

Try the following program to hear the entire vocabulary. You can refer to appendix 1 at the back of this manual to see the word library.

```
    1 FOR S%=0 TO 511
2 CLS: PRINT "WORD NUMBER ";S%
    3 S=USR9(S%):S=USR9(507)
    4 NEXT
```

This vocabulary is the self contained word / phrase library in EASI-SPEECH and offers the most memory conserving way of getting speech output from EASI-SPEECH.

TEXT TO SPEECH CONVERSION

The most usual way to obtain speech output from an allophone speech synthesiser is by using a text converter. The required speech is input in the form of strings. The user is, however, required to spell many words in a way more similar to the way the word is pronounced to give the best pronunciation of that word. For example try:

```
S$=USR9("TWO")
```

You will find that the following version sounds better:

```
S$=USR9("T^OUU")
```

The ^OUU part of the word represents a single allophone which makes a sound like "ouu". There are 59 allophones in total, and 5 different length pauses in the speech chip's vocabulary. The Text to Speech converter scans the text and selects the appropriate allophones to produce the speech. There are many allophones which make the sound of two or three letters pronounced together, such as the "ER" in computer. To tell the computer that this requires a different sound to the "ER" in error, the "ER" in the text should be written as "*ER". The allophones available are as follows:

ALLOPHONE	EXAMPLE	ALLOPHONE	EXAMPLE
A	hat	*AA (*AY)	say
B	hub	*AR	far
C	can	*BB	bag
D	mud	*CH	speech
E	beg	*CK	black
F	find	*DD	dirt
G	haggle	*EE	see
H	hello	*EH	act
I	nit	*ER	interrupt
J	jug	*GG	guest
K	kind	*HH	horse
L	fall	*II	buy
M	mug	*LL	saddle
N	anvil	*NG	string
O	stop	*NN	north
P	pie	*OO	too
Q	queen	*OR	nor
R	far	*OU	to
S	sin	*OW	now
T	eat	*OY	toy
U	bun	*RR	reed
V	very	*SH	shut
W	wind	*TH	thin
X	extra	*TT	test
Y	you	*UH	foot
Z	zoo	*WH	wig
^AER	wear	*YY	yes
^EAR	fear	*ZH	azure
^ERR	minder		
^DTH	width		
^GGG	bug		
^OUU	glue		

The allophones represented by the letter pairs must be preceded by a " ¥ ", the three letter allophones must be preceded by a " ^ " if they are to be recognised by the text converter. It is certainly worth experimenting with different spelling to obtain the most convincing sound for any word as pronunciation of words varies across the country.

To use the Text to Speech converter you may use either:

```
e.g.    S$=USR9("HE¥LL¥OW")

                  OR

        A$="G¥UHD LU¥CK"
        S$=USR9(A$)
```

It is good practice to use one variable name, in this case S$, for doing all the speech calls and to not use this variable elsewhere in your program.

Do not be afraid to experiment with the different sounds and spellings as you will not crash or damage the computer. It is often useful to repeat a letter in certain places, for instance to produce the word SUN, "SSUUN" will sound better than "SUN". You can also call the individual allophones by using their two digit hexadecimal identification number should you so wish. In the unlikely event that you use this facility, use the format #13 to call allophone &h13. See example below and APPENDIX 2 for hexadecimal codes of allophones.

```
        A$="#24#1E#15 #2D#0F#29"
        S$=USR9(A$)
```

This feature has been added for completeness rather than usefulness.

Spaces and punctuation marks are programmed to produce different length pauses. Care should be taken not to use the comma as the MSX Basic will interpret the comma as an end of string marker.

WORD LIBRARY USE

The word library is simple to use and will produce a compact program. To sound any word or phrase in the library simply use:

```
S=USR9(integer number between 0 and 511)

E.G.    S=USR9(23)

OR      S=USR9(&H20)

OR      N%=50:S=USR9(N%)
```

To use the word library for example you could use:

```
1 READ N%:IFN%=1000 THEN END
2 S=USR9(N%)
3 GOTO1
100 DATA 297,505,266,503,288,503,294,503,306,503,138,503,165,1000
```

If the number or variable in brackets is not an integer, no sound will be produced for that number. For example:

```
WRONG           S=USR9(23.5)
WRONG           N=50:S=USR9(N)
```

To enable you toproduce all of your speech using this numeric word library system, you can call up the individual allophones from within the library. Therefore if you cannot find the word you need in the library you can construct it. The allophones start in numeric order at number 394 in the library. For example change line 100 in the previous example program to this:

```
100 DATA 297,505,266,503,288,503,294,503,414,503,422,418,405,453,405,418
        ,1000
```

INTERRUPTS

You may have noticed when using EASI-SPEECH that when sound is being produced, nothing else is happening as the computer is waiting for the speech to finish. The major advantage of this system is that the speech unit does not require a speech buffer and so no program memory is taken up.

If it is a disadvantage in your program to have operations suspended during speech, this can be overcome in the following manner.

Step 1. CLEAR to a value 62064 (&HF270) or below using the CLEAR command.

Step 2. Use the command S=USR9(&HFFFF)

The speech unit will now be interrupt driven which means that the computer can perform other tasks at the same time as speech is being produced. A speech buffer is created above the cleared address and speech to be output is stored here. The disadvantages are:

1. About 280 bytes of program memory are lost.
2. A slight degradation of speech quality may result.
3. If the speech buffer is filled to capacity, the last words entered into the buffer will be shortened so as not to corrupt the program memory. This is not likely to occur in normal use.

A return to non-interrupt operation can be acheived by again using the command S=USR9(&HFFFF). This command toggles between interrupt and non-interrupt modes. To discover which mode EASI-SPEECH is in at any time use:

```
S=PEEK(5+PEEK(&HF3AC)+256¥PEEK(&HF3AD))

If S=0 then EASI-SPEECH is in non-interrupt mode.
If S=255 then EASI-SPEECH is in interrupt mode.
```

Interrupt mode cannot by selected without the necessary clear command.

USER WORD / PHRASE LIBRARIES FOR THE ADVANCED PROGRAMMER

It is possible for the advanced programmer to build his own word libraries in memory. The word library consists of two distinct parts. The first part is a look up table of the start addresses of the word definitions. This table must start on a 256 byte boundary above &H8000, e.g. &h8700 or &HAA00 and consist of up to 256 two-byte addresses.

The second part of the library is the word definitions. These can be located anywhere in memory above &H8000 and consist of the codes for the required allophones. All allophone codes are less than 64 (&H3F), however, the final allophone in any word or phrase must have 128 added to the allophone code. It is not necessary to make the last allophone a pause, although you may if you wish. You may construct as many word libraries as you require.

Example: To construct a 2 word library at &HB800, with word definitions starting at &HC000. First word HAT, second word CAN.

MEMORY ADDRESS	MEMORY CONTENT (POKED)
&HB800	&H00 HAT ADDRESS LSB
&HB801	&HC0 HAT ADDRESS MSB
&HB802	&H03 CAN ADDRESS LSB
&HB803	&HC0 CAN ADDRESS MSB
&HC000	&H39 (%HH)
&HC001	&H18 (A)
&HC002	&H91 (128+T)
&HC003	&H08 (C)
&HC004	&H18 (A)
&HC005	&H8B (128+N)

The words can be spoken from your own word libraries using the following format.

N% = word number + table base address
for HAT N%=&HB800 for CAN N%=&HB801
then S=USR9(N%) to speak word (or phrase)

All calls to EASI-SPEECH from machine code programs can be performed by simulating a BASIC USR9 call by setting the appropriate memory locations and registers.

To pass a number to EASI-SPEECH set A=2, &HF663=2, load the integer into &HF7F8/9, disable the interrupts, and call the routine pointed to by address &HF3AC. For strings, A=3, &HF663=3, and &HF7F8/9 points to the string descriptor.

The presence or absence of an EASI-SPEECH cartridge can be easily detected from BASIC by using:

```
S=PEEK(&HF3AC)+256*PEEK(&HF3AD)
IF S > &HFD08 THEN EASI-SPEECH IS PRESENT.
```


0	ZERO	50	A
1	ONE	51	B
2	TWO	52	C
3	THREE	53	D
4	FOUR	54	E
5	FIVE	55	F
6	SIX	56	G
7	SEVEN	57	H
8	EIGHT	58	I
9	NINE	59	J
10	TEN	60	K
11	ELEVEN	61	L
12	TWELVE	62	M
13	THIRTEEN	63	N
14	FOURTEEN	64	O
15	FIFTEEN	65	P
16	SIXTEEN	66	Q
17	SEVENTEEN	67	R
18	EIGHTEEN	68	S
19	NINETEEN	69	T
20	TWENTY	70	U
21	THIRTY	71	V
22	FORTY	72	W
23	FIFTY	73	X
24	SIXTY	74	Y
25	SEVENTY	75	Z
26	EIGHTY	76	LIGHT
27	NINETY	77	MEDIUM
28	HUNDRED	78	DARK
29	THOUSAND	79	BLACK
30	MILLION	80	BROWN
31	SUNDAY	81	RED
32	MONDAY	82	ORANGE
33	TUESDAY	83	YELLOW
34	WEDNESDAY	84	GREEN
35	THURSDAY	85	BLUE
36	FRIDAY	86	PURPLE
37	SATURDAY	87	GREY
38	JANUARY	88	WHITE
39	FEBRUARY	89	MAGENTA
40	MARCH	90	CYAN
41	APRIL	91	BYE
42	MAY	92	CALENDAR
43	JUNE	93	CLOCK
44	JULY	94	CHECK
45	AUGUST	95	COMPUTER
46	SEPTEMBER	96	CORRECT
47	OCTOBER	97	DATE
48	NOVEMBER	98	DAY
49	DECEMBER	99	NIGHT

100	FIRST
101	SECOND
102	THIRD
103	FOURTH
104	FIFTH
105	SIXTH
106	SEVENTH
107	EIGHTH
108	NINTH
109	TENTH
110	ELEVENTH
111	TWELFTH
112	THIRTEENTH
113	FOURTEENTH
114	FIFTEENTH
115	SIXTEENTH
116	SEVENTEENTH
117	EIGHTEENTH
118	NINETEENTH
119	TWENTIETH
120	THIRTIETH
121	MEGA
122	KILO
123	CENTI
124	MILLI
125	MICRO
126	NANO
127	PICO
128	POINT
129	A.M.
130	P.M.
131	YEAR
132	MONTH
133	WEEK
134	DAY
135	HOUR
136	MINUTE
137	SECOND
138	TIME
139	O'CLOCK
140	AMP
141	VOLT
142	WATT
143	METRE
144	GRAM
145	LITRE
146	NEWTON
147	HENRY
148	HERTZ
149	OHM
150	CENTIGRADE
151	KELVIN
152	FAHRENHEIT
153	MILE
154	YARD
155	FOOT
156	INCH
157	TON
158	POUND
159	OUNCE
160	GALLON
161	PINT
162	PENCE
163	DOLLAR
164	CENT
165	PLEASE
166	ARE
167	IN
168	OUT
169	ON
170	AT
171	THE
172	THIS
173	THAT
174	THEN
175	EXAMINE
176	ENTER
177	LOOK
178	INVENTORY
179	GET
180	PICK UP
181	PUT
182	DROP
183	CLIMB
184	RUN
185	WALK
186	WEAR
187	REMOVE
188	UP
189	DOWN
190	LEFT
191	RIGHT
192	FORWARD
193	BACKWARD
194	EAST
195	WEST
196	NORTH
197	SOUTH
198	PORT
199	STARBOARD
200	SWORD
201	DAGGER
202	KNIFE
203	GUN
204	SLOWLY
205	QUICKLY
206	CAREFULLY
207	I
208	YOU
209	HIM
210	HER
211	US
212	THEM
213	WOOD
214	METAL
215	PLASTIC
216	IRON
217	COPPER
218	BRONZE
219	STEEL
220	PEWTER
221	GOLD
222	SILVER
223	TIN
224	LEAD
225	PLATIGNUM
226	DIAMOND
227	EMERALD
228	SAPPHIRE
229	WIDTH
230	DEPTH
231	HEIGHT
232	LENGTH
233	COLOUR
234	SMELL
235	SOUND
236	SHAPE
237	GREAT
238	LARGE
239	TALL
240	LITTLE
241	SMALL
242	SHORT
243	PRINTER
244	CASSETTE
245	DISC
246	V.D.U.
247	TELEVISION
248	LOAD
249	SAVE
250	CREATE
251	OPEN
252	CLOSE
253	OUTPUT
254	INPUT
255	LETTER
256	NUMBER
257	GAME
258	HELP
259	RESET
260	NAME
261	ADDRESS
262	TELEPHONE
263	YESTERDAY
264	TODAY
265	TOMORROW
266	THIS MORNING
267	THIS AFTERNOON
268	THIS EVENING
269	TONIGHT
270	PRINT
271	INCLUDE
272	ENTER
273	FOR
274	NEXT
275	HEX
276	BINARY
277	DECIMAL
278	OCTAL
279	PRINT
280	WAIT
281	PLAY
282	RECORD
283	TAPE
284	PEEK
285	POKE
286	WHERE
287	WHEN
288	WHAT
289	WHO
290	HOW
291	WHY
292	WHICH
293	WILL
294	IS
295	MANY
296	ANY
297	HELLO HOW ARE YOU
298	GIVE
299	TAKE

300	FRONT
301	BACK
302	TOP
303	BOTTOM
304	SIDE
305	THEE
306	THE
307	HELLO
308	YOURS
309	THEIRS
310	HIS
311	HERS
312	OURS
313	MINE
314	MOST
315	LEAST
316	MAXIMUM
317	MINIMUM
318	FULL
319	EMPTY
320	HALF
321	THIRD
322	QUARTER
323	DOOR
324	WINDOW
325	GATE
326	HOUSE
327	CASTLE
328	ROOM
329	CAVE
330	TUNNEL
331	VERIFY
332	SUN
333	MOON
334	EARTH
335	STAR
336	GOBLIN
337	DWARF
338	ORC
339	WRAITH
340	ELF
341	WIZARD
342	GIANT
343	HORSE
344	TIGER
345	LION
346	MOUSE
347	THICK
348	THIN
349	OVER
350	UNDER
351	ERROR
352	LINE
353	CIRCLE
354	SQUARE
355	TRIANGLE
356	CAT
357	BAT
358	TOAD
359	FROG
360	YOU HAVE LOST
361	YOU HAVE WON
362	PLEASE ENTER YOUR NAME
363	YOU CAN SEE
364	YOU CAN HEAR
365	YOU CAN FEEL
366	YOU CAN SMELL
367	YOU CAN TASTE
368	YOU CAN SENSE
369	YOU ARE INSIDE
370	YOU ARE OUTSIDE
371	YOU ARE CARRYING
372	YOU ARE WEARING
373	YOU ENTER THE
374	YOU LEAVE THE
375	YOU GO THROUGH THE
376	IT IS LIGHT
377	IT IS DARK
378	IT IS HEAVY
379	YOU OPEN THE
380	YOU CLOSE THE
381	YOU HAVE LOST
382	YOU HAVE WON
383	PLEASE ENTER YOUR NAME
384	COPYRIGHT
385	***RECORD PROMPT***
386	***PLAY PROMPT***
387	SKY
388	SEA
389	LAND
390	AIR
391	HOT
392	WARM
393	COLD
394	#00
395	#01
396	#02
397	#03
398	#04
399	#05
400	#06
401	#07
402	#08
403	#09
404	#0A
405	#0B
406	#0C
407	#0D
408	#0E
409	#0F
410	#10
411	#11
412	#12
413	#13
414	#14
415	#15
416	#16
417	#17
418	#18
419	#19
420	#1A
421	#1B
422	#1C
423	#1D
424	#1E
425	#1F
426	#20
427	#21
428	#22
429	#23
430	#24
431	#25
432	#26
433	#27
434	#28
435	#29
436	#2A
437	#2B
438	#2C
439	#2D
440	#2E
441	#2F
442	#30
443	#31
444	#32
445	#33
446	#34
447	#35
448	#36
449	#37
450	#38
451	#39
452	#3A
453	#3B
454	#3C
455	#3D
456	#3E
457	#3F
458	MAN
459	WOMAN
460	BOY
461	GIRL
462	ANSWER
463	CORRECT
464	INCORRECT
465	WAS
466	NEW
467	OLD
468	AT
469	MOTHER
470	FATHER
471	BROTHER
472	SISTER
473	*NOT USED SEE 332*
474	DAUGHTER
475	ALARM
476	ALL
477	AND
478	ATTENTION
479	CAUTION
480	DANGER
481	DO
482	EMERGENCY
483	ESCAPE
484	SAFE
485	NOT
486	ANTICLOCKWISE
487	CLOCKWISE
488	ACCELERATE
489	DECELERATE
490	MINUS
491	NEGATIVE
492	POSITIVE
493	FAST
494	SLOW
495	REVERSE
496	*PINK NOISE*
497	*ALARM TONE*
498	ALERT
499	*SILLY*

```
500     FIRE                    &H5B00  FIRE
501     ****************        &H5B01  FLOOD
502     *   VARIOUS    *        &H5B02  GAS
503     *   LENGTH     *        &H5B03  INTRUDER
504     *   PAUSES     *        &H5B04  SMOKE
505     *   SHORT      *        &H5B05  TOXIC
506     *   & LONG     *        &H5B06  WARNING
507     ****************
508     S *FOR PLURAL'S'*
509     D *FOR END'ED'*
510     *RESERVED*
511     *RESERVED*
```

APPENDIX 2

ALLOPHONE	HEX CODE	ALLOPHONE	HEX CODE
A	18	*AA (*AY)	14
B	1C	*AR	3B
C	08	*BB	3F
D	15	*CH	32
E	07	*CK	29
F	28	*DD	21
G	24	*EE	13
H	1B	*EH	1A
I	0C	*ER	33
J	0A	*GG	3D
K	2A	*HH	39
L	2D	*II	06
M	10	*LL	3E
N	0B	*NG	2C
O	17	*NN	38
P	09	*OO	35
Q	NO ALLOPHONE USE 2A + 2E	*OR	3A
R	27	*OU	16
S	37	*OW	20
T	11	*OY	05
U	0F	*RR	0E
V	23	*SH	25
W	2E	*TH	1D
X	NO ALLOPHONE USE 07 + 29	*TT	0D
Y	31	*UH	1E
Z	2B	*WH	30
^AER	2F	*YY	19
^EAR	3C	*ZH	26
^ERR	34		
^OTH	12 OR 36		
^GGG	22		
^OUU	1F		